

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

Power Outage

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acfm]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
4.131	5,156	105	10	564.7	2.28E-03	2.28E-02	10.32
3.468	5,156	105	21	564.7	1.91E-03	4.01E-02	18.20
3.667	5,156	105	20	564.7	2.02E-03	4.04E-02	18.33
3.441	5,156	105	20	564.7	1.90E-03	3.79E-02	17.20
3.601	5,156	105	20	564.7	1.98E-03	3.97E-02	18.00
3.604	5,156	105	20	564.7	1.99E-03	3.97E-02	18.01
3.556	5,156	105	20	564.7	1.96E-03	3.92E-02	17.77
2.97	5,156	105	19	564.7	1.64E-03	3.11E-02	14.10
Total:					1.57E-02	0.291	131.93

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

UPS Battery Change

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acfm]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
0.414	5,156	105	5	564.7	2.28E-04	1.14E-03	0.52
Total:					2.28E-04	0.001	0.52

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

Low Flow Alarm

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acfm]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
0.963	5,156	105	6	564.7	5.31E-04	3.18E-03	1.44
Total:					5.31E-04	0.003	1.44

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

Primary Aeration Damper Test

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acfm]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
1.882	5,156	105	8	564.7	1.04E-03	8.29E-03	3.76
Total:					1.04E-03	0.008	3.76

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

High Concentration Alarm (cleaned mirrors)

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acfm]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
2.732	5,156	105	9	564.7	1.51E-03	1.35E-02	6.14
2.516	5156	105	12	564.7	1.39E-03	1.66E-02	7.54
Total:					2.89E-03	0.030	13.69

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

Burner Shut Off

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acfm]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
3.74	5,156	105	20	564.7	2.06E-03	4.12E-02	18.69
4.18	5,156	105	20	564.7	2.30E-03	4.61E-02	20.89
4.42	5,156	105	20	564.7	2.43E-03	4.87E-02	22.09
3.84	5,156	105	5	564.7	2.12E-03	1.06E-02	4.80
Total:					8.91E-03	0.147	66.47

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

Solenoid Valve was not operating

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acfm]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
1.6	5,156	105	13	564.7	8.81E-04	1.15E-02	5.20
1.52	5,156	105	20	564.7	8.37E-04	1.67E-02	7.60
1.53	5,156	105	20	564.7	8.43E-04	1.69E-02	7.65
1.44	5,156	105	20	564.7	7.93E-04	1.59E-02	7.20
1.48	5,156	105	21	564.7	8.15E-04	1.71E-02	7.77
1.41	5,156	105	20	564.7	7.77E-04	1.55E-02	7.05
1.38	5,156	105	20	564.7	7.60E-04	1.52E-02	6.90
1.59	5,156	105	20	564.7	8.76E-04	1.75E-02	7.95
1.3	5,156	105	21	564.7	7.16E-04	1.50E-02	6.82
1.28	5,156	105	20	564.7	7.05E-04	1.41E-02	6.40
1.13	5,156	105	18	564.7	6.23E-04	1.12E-02	5.08
Total:					8.63E-03	0.167	75.59

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

Nitrogen Leak

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acfm]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
2.27	5,156	105	19	564.7	1.25E-03	2.38E-02	10.78
2.01	5,156	105	5	564.7	1.11E-03	5.54E-03	2.51
Total:					2.36E-03	0.029	13.29

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

Power failure

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acfm]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
1.08	5,156	105	13	564.7	5.95E-04	7.73E-03	3.51
3.08	5,156	105	20	564.7	1.70E-03	3.39E-02	15.39
1.48	5,156	105	4	564.7	8.15E-04	3.26E-03	1.48
Total:					3.11E-03	0.045	20.38